APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
MASKULINSKI, MICHAEL C

ART UNIT	PAPER NUMBER
2113	

DATE MAILED: 06/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/667,949	UMBERGER ET AL.
	Examiner	Art Unit	
	Michael C. Maskulinski	2113	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>22 September 2003</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-23</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-23</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>22 September 2003</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/26/03; 9/22/03</u>.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

Non-Final Office Action

Double Patenting

1.   The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2.   Claims 1, 3, 4, 11, 13, 15, 16, are rejected on the ground of nonstatutory

obviousness-type double patenting as being unpatentable over claims 1, 3, 4, and 6 of

U.S. Patent No. 6,647,514 B1. Although the conflicting claims are not identical, they are

not patentably distinct from each other because of the following.

Claim(s) 1, 3, 4, and 6 of patent no. 6,647,514 B1 contain(s) every element of

claim(s) 1, 3, 4, 11, 13, 15, 16 of the instant application and as such anticipate(s)

claim(s) 1, 3, 4, 11, 13, 15, 16 of the instant application.

"A later patent claim is not patentably distinct from an earlier patent claim if the

later claim is obvious over, or **anticipated by**, the earlier claim. In re Longi, 759 F.2d at

896, 225 USPQ at 651 (affirming a holding of obviousness-type double patenting

because the claims at issue were obvious over claims in four prior art patents); In re

Berg, 140 F.3d at 1437, 46 USPQ2d at 1233 (Fed. Cir. 1998) (affirming a holding of

obviousness-type double patenting where a patent application claim to a genus is

anticipated by a patent claim to a species within that genus). " ELI LILLY AND

COMPANY v BARR LABORATORIES, INC., United States Court of Appeals for the

Federal Circuit, ON PETITION FOR REHEARING EN BANC (DECIDED: May 30,

2001).

Claim Rejections - 35 USC § 102

3.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4.   Claims 15-20, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated

by Jones, U.S. Patent 5,680,539.

Referring to claim 15, in column 4, lines 30-35, Jones discloses that during non-

idle periods, a Host Queue Depth Monitor executing in conjunction with the Rebuild

Task monitors the current host command queue depth generated by the host and

increases or decreases a Desired Rebuild Queue Depth variable accordingly (a priority

identifier to determine whether host input/output (I/O) requests or rebuild I/O requests

for a storage array are to have priority). Further, in column 4, lines 43-49, Jones

discloses that the Rebuild Task examines the Desired Rebuild Queue Depth variable

and compares this variable with the actual rebuild queue depth. If the actual rebuild

queue depth differs from the Desired Rebuild Queue Depth, the Rebuild Task submits

additional rebuild requests until the rebuild queue depth equals or is a desired

proportion of the Desired Rebuild Queue Depth (and a request dispatcher,

communicatively coupled to the priority identifier, to select host I/O requests and rebuild

I/O requests for execution based at least in part on whether host I/O requests or rebuild

I/O requests are to have priority).

Referring to claim 16, in column 6, lines 34-35, Jones discloses a disk array

(wherein the storage array comprises a redundant array of independent disks (RAID)

system).

Referring to claim 17, in column 4, lines 27-31, Jones discloses a host command

queue (a request queue structure into which the rebuild I/O requests and the host I/O

requests are placed to await selection for execution by the request dispatcher).

Referring to claim 18, in column 7, lines 41-44, Jones discloses that both the host

and the Rebuild Task place requests into the execution queue for execution by the disk

controller (wherein the request dispatcher is configured to select requests from the top

of the queue structure regardless of whether the requests are host I/O requests or

rebuild I/O requests).

Referring to claim 19, in column 4, lines 30-35, Jones discloses that during non-

idle periods, a Host Queue Depth Monitor executing in conjunction with the Rebuild

Task monitors the current host command queue depth generated by the host and

increases or decreases a Desired Rebuild Queue Depth variable accordingly (a queue

controller, communicatively coupled to the request queue structure, configured to order

requests in the queue structure so that host I/O requests are higher than rebuild

requests only if host I/O requests are to have priority).

Referring to claim 20, in column 9, lines 34-38, Jones discloses multi-level

queues (wherein the request queue structure includes a plurality of queues).

Referring to claim 23, in column 7, lines 48-49, Jones discloses that the Rebuild

Task dynamically compensates for the host command queue depth during the rebuild

process (a request processor, communicatively coupled to the request dispatcher, to

process I/O requests and preempt a host I/O request in favor of a rebuild I/O request).

5.   Claims 15 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by

Thompson et al., U.S. Patent 5,822,584.

Referring to claim 15:

a.   In the Abstract, Thompson et al. disclose that the present invention allows

a user to select the drive array subsystem's priority in processing system

requests versus rebuild requests (a priority identifier to determine whether host

input/output (I/O) requests or rebuild I/O requests for a storage array are to have

priority).

b.   In column 16, lines 59-67 continued in column 17, lines 1-11, Thompson

et al. disclose a REBUILD_PRIORITY. This parameter is used by the computer

to rebuild the array. A "0" places rebuild operations at the lowest priority,

whereas, a "255" places rebuild operations at the highest priority (a request

dispatcher, communicatively coupled to the priority identifier, to select host I/O

requests and rebuild I/O requests for execution based at least in part on whether

host I/O requests or rebuild requests are to have priority).

Referring to claim 21, in the Abstract, Thompson et al. disclose a mass storage

drive array subsystem of a computer system (a plurality of resources). Further, in

column 17, lines 9-11, Thompson et al. disclose that when REBUILD_PRIORITY is

"255," the foreground task is delayed after every processed command list for a duration

of 1.6 seconds, thereby allowing the rebuild operations of the present invention to have

the highest priority (wherein the request dispatcher is to limit the host I/O request usage

of at least one of the plurality of resources if rebuild I/O requests are to have priority).

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

7.   Claims 1-4 and 6-14 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Carbonneau et al., U.S. Patent 5,835,700, and further in view of Jones, U.S.

Patent 5,680,539.

Referring to claims 1 and 11, in column 17, lines 30-35, Carbonneau et al.

disclose that if one drive fails, the remaining non-failed drives can continue to supply

user-desired information, although perhaps at a degraded performance rate. If yet

another disk drive fails in the RAID 0 or RAID 5 configuration, it will no longer be

possible to rebuild the lost information (identifying that a storage array is close to

permanently losing data). However, Carbonneau et al. don't explicitly disclose giving, in

response to identifying that the storage array is close to permanently losing data,

input/output (I/O) requests for rebuilding at least a portion of the storage array priority

over host I/O requests. In column 4, lines 30-35, Jones discloses that during non-idle

periods, a Host Queue Depth Monitor executing in conjunction with the Rebuild Task

monitors the current host command queue depth generated by the host and increases

or decreases a Desired Rebuild Queue Depth variable accordingly. It would have been

obvious to one of ordinary skill at the time of the invention to include the prioritization of

rebuild requests of Jones into the system of Carbonneau. A person of ordinary skill in

the art would have been motivated to make the modification because Carbonneau et al.

disclose in column 17, lines 35-38, that when a first failure occurs, it is desirable to bring

the failed drive back into an operational mode as soon as possible in order to minimize

the danger of permanent data loss. Thus, Carbonneau et al. teach an explicit need to

rebuild the array as soon as possible, and Jones satisfies this need by prioritizing

rebuild requests and additionally provides the rebuild requests in such a way that the

array performance is not degraded.

Referring to claims 2 and 12, in column 17, lines 30-35, Carbonneau et al.

disclose that if one drive fails, the remaining non-failed drives can continue to supply

user-desired information, although perhaps at a degraded performance rate. If yet

another disk drive fails in the RAID 0 or RAID 5 configuration, it will no longer be

possible to rebuild the lost information (wherein the identifying comprises identifying that

the storage array is close to permanently losing data when failure of one additional

storage device of a plurality of storage devices in the storage array would result in

permanent data loss in the storage array).

Referring to claim 3, in column 2, lines 52-55, Carbonneau et al. disclose a SCSI-

coupled RAID bank (wherein the storage array comprises a redundant array of

independent disks (RAID) system).

Referring to claim 4, in column 17, lines 11-16, Carbonneau et al. disclose that if

there are only 3 drives in the RAID bank and one drive is failing, the CMAC board might

switch the configuration from RAID level-5 to RAID level-0 providing there is enough

free storage space to support the switch without loss of data (the RAID system includes

a plurality of RAID levels; the identifying comprises identifying when at least one of the

plurality of RAID levels is close to permanently losing data). Further, in column 17, lines

30-35, Carbonneau et al. disclose giving, rebuild I/O requests priority over host I/O

requests only for the at least one RAID level that is close to permanently losing data.

Referring to claim 6, in column 4, lines 31-42, Jones teaches giving host I/O

requests priority over rebuild I/O requests if the storage array is not close to

permanently losing data.

Referring to claim 7, in column 7, lines 41-43, Jones discloses that both the host

and the Rebuild Task place requests into the execution queue for execution by the disk

controller (placing both I/O requests for rebuilding at least the portion of the array and

host I/O requests into a queue in the order they are received; and processing the I/O

requests for rebuilding and the host I/O requests from the queue in a first-in-first-out (FIFO) manner).

Referring to claims 8 and 13, in column 4, lines 30-35, Jones discloses that during non-idle periods, a Host Queue Depth Monitor executing in conjunction with the Rebuild Task monitors the current host command queue depth generated by the host and increases or decreases a Desired Rebuild Queue Depth variable accordingly (allocating, among a plurality of resources in the storage array and a corresponding controller, more resource usage to the I/O requests for rebuilding than to the host I/O requests).

Referring to claim 9, in column 9, lines 38-46, Jones discloses that the disk controller includes a first queue referred to as queue 1, which is a relatively deep queue, and a second intermediate queue referred to as queue 2, which is a relatively shallow queue. As shown, host requests are provided to queue 1 and ultimately filter down to queue 2 before execution. In contrast, the Rebuild Task provides rebuild requests directly to queue 2 (preempting a host I/O request in favor of a rebuild I/O request).

Referring to claims 10 and 14, in column 1, lines 58-67 continued in column 2, lines 1-25, Jones discloses different RAID levels and the number of disks necessary to implement each level. It is inherent to a RAID system how many failed disks in the storage array can be endured without permanently losing data varies based at least in part on a particular redundant array of independent disks (RAID) architecture level of the storage array.

8.   Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the

combination of Carbonneau et al., U.S. Patent 5,835,700 and Jones, U.S. Patent

5,680,539 as applied to claim 4 and further in view of Chen et al., RAID: High-

Performance, Reliable Secondary Storage.

        Referring to claim 5, in column 1, lines 58-67 continued in column 2, lines 1-25,

Jones discloses RAID levels 0-5. However, Jones doesn't explicitly disclose RAID level

6. On page 155, section 3.2.7, Chen et al. disclose RAID level 6. It would have been

obvious to one of ordinary skill at the time of the invention to include the RAID level 6 of

Chen et al. into the combined system of Carbonneau et al. and Jones. A person of

ordinary skill in the art would have been motivated to make the modification because

RAID level 6 provides stronger error correcting codes for applications with more

stringent reliability requirements (see Chen et al.: page 155, section 3.2.7).

9.   Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones,

U.S. Patent 5,680,539, and further in view of Carbonneau et al., U.S. Patent 5,835,700.

22.

        Referring to claim 22, in column 4, lines 27-42, Jones discloses prioritizing

rebuild requests according to a priority identifier. However, Jones doesn't explicitly

disclose that the priority identifier is to determine that rebuild I/O requests are to have

priority if failure of one additional storage device of a plurality of storage devices in the

storage array would result in data loss in the storage array. In column 17, lines 35-38,

Carbonneau et al. disclose that when a first failure occurs, it is desirable to bring the

failed drive back into an operational mode as possible. It would have been obvious to

one of ordinary skill at the time of the invention to include the prioritizing of Carbonneau

et al. into the queue system of Jones. A person of ordinary skill in the art would have

been motivated to make the modification because giving priority to rebuild requests

according to Carbonneau reduces the risk of permanent data loss (see Carbonneau et

al.: column 7, lines 33-38).

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Michael C. Maskulinski whose telephone number is

(571) 272-3649. The examiner can normally be reached on Monday-Friday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Robert W. Beausoliel can be reached on (571) 272-3645. The fax phone

number for the organization where this application or proceeding is assigned is 571-

273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

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For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

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Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael C Maskulinski
Examiner
Art Unit 2113